



**[Billing Code 4140-01-P]**

**DEPARTMENT OF HEALTH AND HUMAN SERVICES**

**National Institutes of Health**

**Government-Owned Inventions; Availability for Licensing**

**AGENCY:** National Institutes of Health, HHS.

**ACTION:** Notice.

**SUMMARY:** The invention listed below is owned by an agency of the U.S.

Government and is available for licensing to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

**FOR FURTHER INFORMATION CONTACT:** Peter Soukas, J.D., 301-594-8730; [peter.soukas@nih.gov](mailto:peter.soukas@nih.gov). Licensing information and copies of the patent applications listed below may be obtained by communicating with the indicated licensing contact at the Technology Transfer and Intellectual Property Office, National Institute of Allergy and Infectious Diseases, 5601 Fishers Lane, Rockville, MD, 20852; tel. 301-496-2644. A signed Confidential Disclosure Agreement will be required to receive copies of unpublished patent applications.

**SUPPLEMENTARY INFORMATION:** Technology description follows.

## **Use of Rostafuroxin to Inhibit Viral Infection**

### **Description of Technology:**

Acute respiratory infections during early childhood constitute a major human health burden. Human respiratory syncytial virus (RSV) is the most common and important viral cause of severe acute pediatric respiratory infections worldwide. Mortality due to RSV in the post-neonatal (28 days to 1 year old) population is second only to malaria. It is estimated that RSV causes 34 million lower respiratory tract infections, 4 million hospitalizations, and 66,000-199,000 deaths every year in children less than 5 years of age. Most mortality occurs in the developing world where clinical care is less accessible. Mortality is low in the developed countries, but the morbidity is substantial: in the United States alone, RSV is associated with an estimated 132,000-172,000 hospitalizations annually in children less than 5 years old. There is not yet available a vaccine or an effective antiviral drug suitable for routine use.

This invention relates to a broadly antiviral small chemical molecule, Rostafuroxin, expected to be well tolerated in humans and available for clinical evaluation. In particular, this patent application relates to the novel and unexpected finding that Rostafuroxin substantially inhibits RSV infection.

ATP1A1 is a host protein involved with cellular entry of RSV. RSV entry was found to require activation of a signaling cascade mediated by ATP1A1 which resembles the signaling pathway (also mediated by ATP1A1) triggered by cardiotonic steroids.

Though not evaluated for RSV, ATP1A1 was previously implicated as a pro-viral factor in the infection cycles of a number of viruses, but the nature of its involvement and

mechanism of action were unknown.

Rostafuroxin, a synthetic digitoxigenin derivative, is a small-molecule that is known to specifically bind ATP1A1. It has not been previously known to have any antiviral activity.

The inventors have evidence that Rostafuroxin inhibits RSV infection in respiratory epithelial cells. Rostafuroxin inhibits RSV induced ATP1A1-mediated signaling pathway required for RSV entry. This was demonstrated in A549 cells, a widely used human respiratory epithelial cell line, and in primary human airway epithelial cells derived from a healthy human.

Rostafuroxin has been previously tested in clinical studies as an anti-hypertensive agent. It has no adverse effects in healthy humans and, importantly, does not lower the normal systolic blood pressure of healthy individuals.

Rostafuroxin is a promising anti-viral drug candidate for RSV and possibly other viruses that use the same pathway for host cell entry.

This technology is available for licensing for commercial development in accordance with 35 U.S.C. § 209 and 37 CFR Part 404, as well as for further development and evaluation under a research collaboration.

**Potential Commercial Applications:**

- Viral therapeutics
- Viral diagnostics
- Vaccine research

**Competitive Advantages:**

- Ease of manufacture

- Broad antiviral activity
- Favorable safety profile in clinical trials

**Development Stage:**

- In vivo data assessment (animal)

**Inventors:** Shirin Munir (NIAID), Matthias Lingemann (NIAID), Peter Collins (NIAID).

**Intellectual Property:** HHS Reference No. E-202-2018-0 —U.S. Provisional Application No. 62/737,899, filed September 27, 2018 (pending).

**Licensing Contact:** Peter Soukas, J.D., 301-594-8730; peter.soukas@nih.gov.

**Collaborative Research Opportunity:** The National Institute of Allergy and Infectious Diseases is seeking statements of capability or interest from parties interested in collaborative research to further develop, evaluate or commercialize for development of a vaccine for respiratory or other infections. For collaboration opportunities, please contact Peter Soukas, J.D., 301-594-8730; peter.soukas@nih.gov.

Dated: October 15, 2018.

**Suzanne M. Frisbie,**

*Deputy Director,*

*Technology Transfer and Intellectual Property Office,*

*National Institute of Allergy and Infectious Diseases.*

[FR Doc. 2018-23312 Filed: 10/24/2018 8:45 am; Publication Date: 10/25/2018]